

Claims 1 - 57 are rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 6,323,132, to Hwang et al., in view of U.S. Patent No. 6,094,334, to Bedi et al.

Claims 1 - 3, 28, and 33 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1 - 3, 13, 15, and 25 of copending Application Serial No. 09/747,652, of Hwang et al.

Please amend the application as follows:

IN THE DRAWINGS:

Please replace the originally submitted informal drawings with the enclosed formal drawings.

IN THE CLAIMS:

Independent Claims 1, 28, 33, and 44 are being amended to refer to the surface of the substrate, for purposes of clarification only.

*The claims are not being amended at this time, but are presented in italics below for reference purposes.*

1. (Once Amended) A method of preheating a substrate which includes a metal-containing layer on an exposed surface of said substrate to a temperature of at least 150 °C, wherein said method comprises exposing said exposed surface of said substrate to a preheating plasma which is sufficiently reactive with said metal-containing layer that a deposit or residue formed during preheating which includes metal from said metal-containing layer is more easily etched than said metal-containing layer during a subsequent plasma etching of said metal-containing layer, wherein said metal is selected from the group consisting of platinum, iridium, ruthenium, and combinations thereof.

2. *The method of Claim 1, wherein said metal-containing layer is a platinum-containing layer and a first source gas used to produce said preheating plasma includes nitrogen.*
3. *The method of Claim 2, wherein said platinum-containing layer is platinum.*
4. *The method of Claim 2 or Claim 3, wherein said first source gas is at least 50 % by volume nitrogen.*
5. *The method of Claim 4, wherein a second plasma source gas used during subsequent plasma etching of said platinum-containing layer or said platinum layer is at least 15 % by volume nitrogen.*
6. *The method of Claim 1, wherein said metal-containing layer is a ruthenium-containing layer and a first source gas used to produce said preheating plasma includes a gas selected from the group consisting of nitrogen, oxygen, and combinations thereof.*
7. *The method of Claim 6, wherein said ruthenium-containing layer is ruthenium oxide.*
8. *The method of Claim 6, wherein said ruthenium-containing layer is ruthenium.*
9. *The method of Claim 7 or Claim 8, wherein said first source gas is at least 50 % by volume nitrogen.*
10. *The method of Claim 9, wherein said first source gas is nitrogen.*
11. *The method of Claim 7 or Claim 8, wherein said first plasma source gas is at least 50 % or more oxygen by volume.*

12. *The method of Claim 11, wherein said first plasma source gas is oxygen.*
13. *The method of Claim 9, wherein a second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is at about 70 % or more oxygen by volume.*
14. *The method of Claim 10, wherein a second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is about 70 % or more oxygen by volume.*
15. *The method of Claim 11, wherein a second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is at about 70 % or more oxygen by volume.*
16. *The method of Claim 12, wherein a second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is about 70 % or more oxygen by volume.*
17. *The method of Claim 1, wherein said metal-containing layer is an iridium-containing layer and a first source gas used to produce said preheating plasma includes a gas selected from the group consisting of nitrogen, oxygen, and combinations thereof.*
18. *The method of Claim 17, wherein said iridium-containing layer is iridium oxide.*
19. *The method of Claim 17, wherein said iridium-containing layer is iridium.*
20. *The method of Claim 18 or Claim 19, wherein said first source gas is at least 50 % by volume nitrogen.*

21. *The method of Claim 20, wherein said first source gas is nitrogen.*
22. *The method of Claim 18 or Claim 19, wherein said first plasma source gas is about 50 % or more oxygen by volume.*
23. *The method of Claim 22, wherein said first plasma source gas is oxygen.*
24. *The method of Claim 20, wherein a second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % or more oxygen by volume.*
25. *The method of Claim 21, wherein a second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % or more oxygen by volume.*
26. *The method of Claim 22, wherein a second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % or more oxygen by volume.*
27. *The method of Claim 23, wherein a second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % or more oxygen by volume.*
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28. (Once Amended) A method of plasma heating a substrate and etching a platinum-containing layer on an exposed surface of said substrate, said method comprising:
- A2      a) supplying a first nitrogen-comprising plasma source gas to a process chamber containing said substrate;.
- b) preheating said substrate to a temperature of at least 150 °C using ion bombardment from a plasma generated from said first nitrogen-comprising plasma source gas;

c) supplying a second nitrogen-comprising plasma source gas to said process chamber; and

*A2 end*  
d) forming a plasma from said second nitrogen-comprising source gas to etch said platinum-containing layer while removing platinum-comprising deposits generated during said preheating of said substrate.

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29. *The method of Claim 28, wherein said first nitrogen-comprising plasma source gas contains at least 50 % nitrogen by volume.*

30. *The method of Claim 29, wherein said first nitrogen-comprising plasma source gas is nitrogen.*

31. *The method of Claim 28 or Claim 29, wherein said second nitrogen-comprising plasma source gas contains about 15 % or more nitrogen by volume.*

32. *The method of Claim 31, wherein said second nitrogen-comprising plasma also includes at least one inert, non-reactive gas selected from the group consisting of helium, neon, argon, krypton xenon, and combinations thereof.*

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33. (Once Amended) A method of plasma heating a substrate and etching a ruthenium-containing layer on an exposed surface of said substrate, said method comprising:

*A3*  
a) supplying a first plasma source gas comprising a gas selected from the group consisting of nitrogen, oxygen, or combinations thereof into a process chamber containing said substrate;.

b) preheating said substrate to a temperature of at least 150 °C using ion bombardment from a plasma generated from said first plasma source gas;

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- c) supplying a second plasma source gas comprising oxygen to said process chamber;  
and  
d) forming a plasma from said second source gas to etch said ruthenium-containing layer while removing ruthenium-comprising deposits generated during said preheating of said substrate.
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34. *The method of Claim 33, wherein said ruthenium-containing layer is ruthenium oxide.*
35. *The method of Claim 33, wherein said ruthenium-containing layer is ruthenium.*
36. *The method of Claim 34 or Claim 35, wherein said first source gas is at least 50 % by volume nitrogen.*
37. *The method of Claim 36, wherein said first source gas is nitrogen.*
38. *The method of Claim 34 or Claim 35, wherein said first source gas is about 50 % or more oxygen by volume.*
39. *The method of Claim 38, wherein said first plasma source gas is oxygen.*
40. *The method of Claim 36, wherein said second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is at about 70 % by volume or more oxygen.*
41. *The method of Claim 37, wherein said second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is about 70 % by volume or more oxygen.*

42. *The method of Claim 38, wherein said second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is at about 70 % by volume or more oxygen.*

43. *The method of Claim 39 wherein said second plasma source gas used during subsequent plasma etching of said ruthenium-containing layer is about 70 % by volume or more oxygen.*

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44. A method of plasma heating a substrate and etching an iridium-containing layer on an exposed surface of said substrate, said method comprising:

a) supplying a first plasma source gas comprising a gas selected from the group consisting of nitrogen, oxygen, and combinations thereof into a process chamber containing said substrate;.

b) preheating said substrate to a temperature of at least 150 °C using ion bombardment from a plasma generated from said first plasma source gas;

c) supplying a second plasma source gas to said process chamber; and

d) forming a plasma from said second source gas to etch said iridium-containing layer while removing iridium-comprising deposits generated during said preheating of said substrate.[.]

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45. *The method of Claim 44, wherein said second source gas includes oxygen.*

46. *The method of Claim 44 or Claim 45, wherein said iridium-containing layer is iridium oxide.*

47. *The method of Claim 44 or Claim 45, wherein said iridium-containing layer is iridium.*

48. *The method of Claim 44, wherein said first source gas is at least 50 % by volume nitrogen.*

49. *The method of Claim 44, wherein said first source gas is about 50 % or more oxygen by volume.*

50. *The method of Claim 45, wherein said second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % by volume or more oxygen.*

51. *The method of Claim 46, wherein said second plasma source gas used during subsequent plasma etching of said iridium-containing layer is about 70 % by volume or more oxygen.*

52. *The method of Claim 47, wherein said second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % by volume or more oxygen.*

53. *The method of Claim 48, wherein said second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % by volume or more oxygen.*

54. *The method of Claim 49, wherein said second plasma source gas used during subsequent plasma etching of said iridium-containing layer is at about 70 % by volume or more oxygen.*

55. *The method of Claim 50, wherein said second plasma source gas includes an inert, non-reactive gas selected from the group consisting of helium, neon, argon.*

56. *The method of Claim 51, wherein said second plasma source gas includes an inert, non-reactive gas selected from the group consisting of helium, neon, argon.*

57. *The method of Claim 52, wherein said second plasma source gas includes an inert, non-reactive gas selected from the group consisting of helium, neon, argon.*